

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2004/016461

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl⁷ F01D5/14, 5/30, 9/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl⁷ F01D5/14, 5/30, 9/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2004
Kokai Jitsuyo Shinan Koho 1971-2004 Toroku Jitsuyo Shinan Koho 1994-2004

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 62-3847 A (MAN Gutehoffnungshütte GmbH), 09 January, 1987 (09.01.87), Page 4, upper left column, line 7 to upper right column, line 8; Figs. 1 to 3 & DE 3514122 A1 & EP 199073 A1 & US 4704066 A1	1-4, 6, 8-9 10-15
X Y	JP 5-44691 A (Mitsubishi Heavy Industries, Ltd.), 23 February, 1993 (23.02.93), Full text; Figs. 1 to 6, 8 (Family: none)	1-4, 6, 8-9 10-15
X Y	JP 55-142909 A (Hitachi, Ltd.), 07 November, 1980 (07.11.80), Full text; Figs. 1 to 8 (Family: none)	1-3, 6, 8-9 10-15

☒ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search
24 January, 2005 (24.01.05)

Date of mailing of the international search report
15 February, 2005 (15.02.05)

Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 149742/1980 (Laid-open No. 73304/1982) (Tokyo Shibaura Electric Co., Ltd.), 06 May, 1982 (06.05.82), Figs. 5 to 6 (Family: none)	10
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 156772/1986 (Laid-open No. 63503/1988) (Hitachi, Ltd.), 26 April, 1988 (26.04.88), Figs. 1, 3(b) (Family: none)	11
Y	JP 61-252838 A (MTU MOTOREN-UND TURBINEN-UNION MÜNCHEN GMBH), 10 November, 1986 (10.11.86), Fig. 1 & DE 3514354 A1 & EP 203353 A1 & US 4709546 A1	10-14
Y	JP 1-237305 A (Toshiba Corp.), 21 September, 1989 (21.09.89), Figs. 5 to 6, 9 (Family: none)	15

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Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 5 and 7
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

See extra sheet.

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

The invention of claim 1 is a well-known technique, and the matter common to claims 1-15 is not a special technical feature within the meaning of PCT Rule 13.2, second sentence.

Accordingly, the inventions of claims 1-2, the inventions of claims 3-7, the invention of claim 8, the inventions of claims 9-14, and the invention of claim 15 are different invention groups.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

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Continuation of Box No. II-2 of continuation of first sheet (2)

That "the distance H_0 from the wall surface in the height direction of the front edge is set to a range of $H_0 = (0.5 \text{ to } 2.0)T$ with T being the thickness of a boundary layer of a working fluid," which is described in claim 5, means that the height is set by the thickness T of a boundary layer that varies according to the operating condition of a turbine. The above is technically unsure, and therefore it lacks the clarity that PCT Article 6 requires.

That "when allocated to an angle θ with a stagnation point of a working fluid that collides a front edge of a blade body set as the standard, the angle θ is set to a range of $\theta = \pm 15^\circ$ to $\pm 60^\circ$," which is described in claim 7, means that the starting point of reckoning of an angle is set by a stagnation point of a working fluid, the stagnation point varying according to the operating condition of a turbine. Even if the starting point is determined, only the starting point cannot determine the standard line for reckoning the angle, and the range of a fan-like angle is undefined. Therefore, the above lacks the clarity that PCT Article 6 requires.